CAN DEFENSE SPENDING BE JUSTIFIED DURING A PERIOD OF CONTINUAL PEACE?

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

Chong Kai-Yew, MAJ
Singapore Armed Forces
B.A., Christ College, Cambridge, England, 1985

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This study investigates the nature of defense and analyzes defense spending in an economic-rationality framework. It attempts to find justification for defense spending within such a framework.

The study examines the nature of international conflict and the need for defense. Sun Tsu said, "It is a doctrine of war not to assume the enemy will not come, but rather to rely on one's readiness to meet him; not to presume he will not attack, but rather to make one's self invincible."

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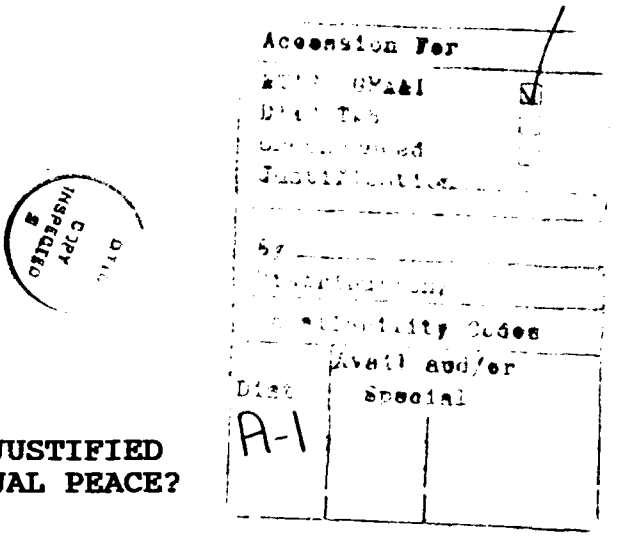

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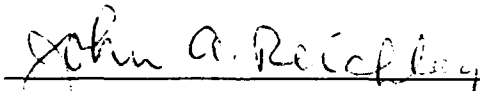
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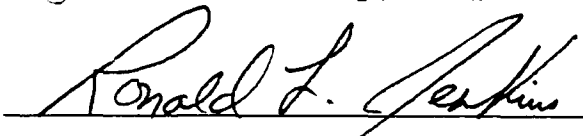
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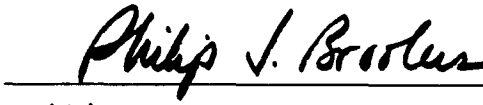
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ABSTRACT

CAN DEFENSE SPENDING BE JUSTIFIED DURING A PERIOD OF CONTINUAL PEACE by MAJ Chong Kai-Yew, Singapore Armed Forces, 102 pages.

This study investigates the nature of defense and analyzes defense spending in an economic-rationality framework. It attempts to find justification for defense spending within such a framework.

The study examines the nature of international conflict and the need for defense. Sun Tsu said:

> It is a doctrine of war not to assume the enemy will not come, but rather to rely on one's readiness to meet him; not to presume he will not attack, but rather to make one's self invincible.

Indeed, defense spending in a period of continual peace is an insurance against the wrath of a violent enemy. There is no market mechanism to determine the "correct" amount of defense to be acquired vis-a-vis the security desired. How much is required depends solely on the assessments of defense planners and decisions of political leaders.

In war there is no substitute for victory. When called upon, the nation's armed forces must be able to decisively defeat the enemy. The key to defense spending in a period of continual peace is in adopting a strategy which exploits the reduced risk of war. A smaller standing armed force, astute intelligence and rapid mobilization are vital elements of such a strategy.

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CHAPTER 1

INTRODUCTION

The subject is defense spending and how, if at all, it may be justified during a period of continual peace. The focus is on defense spending in a period absent of any tangible or visible security threat as perceived by the people of a country.

THE BACKGROUND

It is traditionally accepted that the manner in which a nation builds its defenses depends mostly on its perception of threat. This threat may be highly visible, like that experienced by Israel in the Middle East, or subtle. It may be credulous, however, to assume that a threat is totally non-existent when one is not evident. It is not difficult to justify defense spending when there is a visible threat against which a nation arms itself. As the threat reduces in visibility, however, it becomes increasingly difficult to justify defense spending. With reduced threat, governments will be under increased pressure to divert resources away from defense toward improving the standard of living, such as social welfare and health care. There will always be competing needs for the nation's finite resources. With the

widespread political changes taking place today in Eastern Europe and the reduction in the Communist threat, for instance, the United States will find it increasingly difficult to justify sustaining its defense spending at Cold War levels.

BUTTER OR GUNS

The question of more butter or more guns is an age-old one. The fundamental economic problem of choice in a world of limited resources applies to defense, just as to all other economic decisions which must be made every day. With more expenditure on defense, we can generally expect to feel more safe and secure against threats which can undermine our survival. Should we, then, spend as much as we "can afford" on defense, so as to be "as safe as we can possibly be"?

It is naive to use a caveat such as "as much as we can afford", for it ignores the fundamental problem of economic choice, of balancing limited resources against unlimited wants. Because of unlimited wants and limited resources to fulfill them, there is always an opportunity cost attached to every choice we make. If we spend more on defense, there will be fewer resources for welfare, social services, and nation building. If more raw materials are used in defense industries, less will be available for consumer industries.

If more ore is mined today, less will be available for future generations.

The financing of defense spending has also become a major concern in recent years. This is especially so in the United States where the defense budget makes up the single largest percentage of federal spending. When increases in the defense budget is allowed to outpace increases in tax revenue,[1] the goverment must do one of two things: it must either revise its tax policies to increase tax revenue, or it must finance the deficit by either borrowing or "printing money."[2] Increases in taxation are usually undesirable. It is politically expensive, and it distorts the price structure.[3] Deficit financing is also not desirable when an economy is at or near full employment. "Printing money" is inflationary, while borrowing tends to raise interest rates, "crowd out" private-sector investment, and put an upward pressure on the exchange rate which undermines domestic

[1]This happens when policymakers decide that there are compelling reasons to spend more on defense despite revenue constraints.

[2]This has been the "classical" way in which a government increases money supply. With more elaborate banking and credit systems in place today, printing money is no longer the only way to increase the supply of money.

[3]The price structure plays an important role in a free-market economy. It is the basis for the efficient allocation of resources.

competitiveness in foreign markets. It should be pointed out, though, that in a period of high unemployment, goverment expenditure and deficit financing policies are useful in stimulating the economy back to full employment.

UNCERTAINTY

As an old Chinese saying goes, "we train an Army a thousand days, just so to be able to use it for a day." No one will quarrel with the dictum that readiness is the key to successful defense. We need only look at the recent Iraqi invasion of Kuwait to realize the importance of being ready. But just how ready, and how strongly, should we arm ourselves, when it is not clear what the threat is during peacetime? Sun Tsu had said:

> ... skilful warriors first made themselves invincible and awaited the enemy's moment of vulnerability.
>
> Invincibility depends on one's self; the enemy's vulnerability on him.
>
> ... those skilled in war can make themselves invincible but cannot cause an enemy to be certainly vulnerable.
>
> Therefore ... one may know how to win, but cannot necessarily do so.[4]

There is no certainty in war. How do we, then, deal with the risk and uncertainty of threat?

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[4]Sun Tsu, The Art of War, trans. Samuel Griffith. (Oxford: Oxford University Press, 1963), 85.

The problem of how much to spend on defense is one that plagues both defense planners and politicians alike. We learned from the experiences of previous attempts to build the "invincible" tank that it is just as impossible to build the invincible military. If the invincible military force is impossible, and the threat is, at best, vague, then at what level should military buildup be allowed to proceed, and how much of a nation's resources should be directed to defense?

"Nothing ventured, nothing gained". Few will disagree with the underlying wisdom. Certainly, modern day free market economies thrive on the entrepreneurs' willingness to take risks. Is there a lesson here for defense spending? Can it be that the safest option may not be the best option?

DEFENSE AND POLITICS

In On War,[5] Clausewitz noted that war was "merely a continuation of policy by other means". Indeed, a failure to recognize this political nature of war will make any analysis of defense spending incomplete and misleading. Defense is an N-person zero-sum game in the complex arena of

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[5]Carl von Clausewitz, On War, trans. and ed. Michael Howard and Peter Paret, rev. ed. (Princeton, 1984), bk 1, pp. 87.

international politics. Each player-nation attempts to gain an advantage over the rest by either exploiting its geographic element of power,[6] or by having superior economic or military power to persuade, influence or coerce others into terms beneficial to itself. Player-nations may also at times collude for mutual gains. Every player will act in his own, and only his own, best interest. If we subscribe to the view that the "game" is a struggle for relative positional advantage, and that military power is a necessary element to that struggle,[7] then defense spending must be doomed to follow an explosive trend regardless of threat perception.[8] But what is the prize for the winner of this game, and what amount of resources should be staked in the game, vis-a-vis the cost of "playing" it?

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[6]This refers to a nation's power over another by virtue of its geographic location, its command of strategic lines of communications, and its control of natural resources.

[7]The traditional role of military power is to threaten an opponent with the use of force, and to deter or defend against his use of force. There is, however, a succinct distinction to be made between a threat to use force and the actual use of force. Very often it is the threat of force, rather than its actual use, that plays an important role in the international relations "game". This important distinction will be further discussed in chapter 4.

[8]Some may argue that arms limitation treaties and other arms control measures will, at least, retard the arms race. This may be an overly optimistic view because of the problem of verification.

THE RESEARCH PROBLEM

In summary, the problem of defense spending during a period of continual peace is not only complicated by uncertainty and the absence of a visible threat, but also by the relative "decay" of one's military power through arms race. This leads to a number of questions which require some answers. How does the threat perception affect defense spending decisions? How little can we afford to spend on defense against these perceived threats without serious compromise to our security during peacetime? Should defense be planned for a "worst-case" scenario, even during a period of continual peace? Is the safest "worst-case" option the best option? Is there a case for sustained defense spending during a period of continual peace? How can we justify the national expenditure on defense against the resulting opportunity costs to social and economic welfare in a period absent of any visible threat?

The purpose of this paper is to establish a theoretical model for understanding and evaluating defense spending decisions. It is not the intention of the paper to offer a quantitative solution to the research question. The paper will not be prescriptive, but descriptive. It will attempt to distill the main factors influencing defense spending decisions and examine their nature and the effects. The

model developed will, hopefully, provide a theoretical framework for both government decision makers and the interested observer to understand and appraise defense spending decisions.

The paper will address the issue of defense spending from two different perspectives - a superpower perspective, namely the United States', whose security interests are global; and the perspective of a hypothetical "small nation", whose interests are more regional in nature. For expository purposes in this study, a "period of continual peace" is defined to be one where the threat to a nation's survival, perceived or otherwise by that nation, is non-existent or is unlikely. This is a period where every informed person believes that the nation will not be threatened or plunged into an armed conflict. It is not the intent of this paper to comment on the course of world politics. It is recognized that armed conflicts do break out from time to time. This study will focus only on how a nation may justify continuing to spend on defense when there is no immediate threat.

Throughout this paper, defense spending refers to both military and military-related spending. It excludes nonmilitary spending even if this is in furtherance of

national security interests (eg. economic aid). Defense spending is used interchangeably with military spending in this thesis.

CHAPTER 2

LITERATURE REVIEW

From the comparative analyses of national defense spending across countries to the appraisal of United States defense expenditures, from defense economics to the mechanics of defense administration, and from the arms race to the balance of power, **defense spending** is a subject economists, political scientists, sociologists, journalists, politicians, and military professionals have variously written about.

The subject may generally be subdivided into three major areas:

a. Defense economics. Two schools of thought exist. A "top down" school, whereby resources are thought to be "arbitrarily"[9] allocated to defense planners based on decisions from the top government decision-making body, and a "bottom up" school where requirements are generated from defense planners and surfaced for approval by the decision-

[9]There are economic theories of optimal resource allocation, but they are of little more than academic value. Suffices to say that decision is made based on some "rule-of-thumb" such as past experience.

makers. It is most likely, however, that a mixture of both approaches is practised in the real world. Much has been written about the efficient allocation of resources at the micro (bottom) level. But how do the top level decision makers decide how much to spend on defense vis-a-vis on health care, or road building? The paper will attempt to address this issue.

b. National security strategy formulation. Although national expenditure allocation is an economic problem, the decision on defense spending cannot be divorced from national security strategy formulation. Unfortunately, most writings on national security strategy formulation had, conveniently, ignored the problem of financing. Few scholars had ventured into this area.

c. International politics and the balance of power. Like national security strategy formulation, there is little scholarly research into the realm of financing the international politics "game". Game theories deal extensively with payoffs, financial or otherwise. But should cost not play a role too?

DEFENSE ECONOMICS

Defense economics analyzes defense as an economic activity, and focuses primarily on the problem of public

sector resource allocation. In a market economy, the quantities of a good produced is determined by the market forces of demand and supply. When the demand for a good increases, the resulting shortage from the increased demand puts an upward pressure on the price. Assuming that no single producer dominates the market, the higher prices will encourage producers to increase their production to meet the shortages, and new producers will be attracted to enter the market, leading to an increase in supply of the good in question.

For economically efficient resource allocation, goods must be produced at quantities where their marginal rates of substituition in exchange between any two goods, x and y, equal their marginal rates of transformation in production.[10] This just means that at those levels of efficient production of goods x and y, the rate, or willingness, with which **consumers** are willing to trade between x and y must equal the rate at which x has to be given up in order to **produce** more of y (assuming that the economy is at full employment, and that more of y can only be produced at the expense of x). In a perfect market situation, this allocative efficiency is achieved through

[10]K.D.George & John Shorey, The Allocation of Resources (London: George Allen & Unwin, 1978), 19-28.

the price mechanism - with prices adjusting upward or downward to encourage or discourage consumption and production.

There is, however, one class of "goods" whose supply does not respond in a similar way to changes in demand. These are public goods. The essential characteristic of a public good is that its consumption by one person does not detract from its availability to others.[11] In other words, there is non-rivalry, or a zero opportunity cost, in consumption. National defense, police protection, and radio broadcasting are typical examples of public goods. Thus the fact that one person feels more secure as a result of expenditure on national defense does not prevent other people from also feeling more secure. Conversely, once provided, all citizens within the geographic boundary, whether they wished to or not, enjoy the security of national defense.

The question of whether or not it is possible to supply a good by private enterprise depends on the excludability characteristics of the good. The market system will work only if the producer is able to prevent a consumer from using the good, whose use the producer will charge a price.

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[11]Ibid., 222-224.

Defense is a non-excludable. It can therefore only be "produced", if at all, by the government, and paid for "collectively" by the citizens through government levied taxes. The "amount" of defense to be produced is, thus, determined by government planners and decision makers, based on political factors and other non-economic factors such as threat, as well as on economic[12] ones.

Defense, however, is unlike other public goods. Defense is not just a pure economic activity in the way we normally think of an economic activity - production of a good or service for sale in a market. Much of defense has to do, also, with national survival and security, and concerns both political and strategic imperatives.

Charles Hitch[13] and Roland McKean's Economics of Defense in the Nuclear Age[14] was the first noteworthy attempt at linking the economics of defense to strategy. To them, strategies were "ways of using budgets or resources to

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[12]This is mainly a decision on how the expenditure is to be financed; from taxes raised or from borrowing. Economic factors may include some considerations on inflation, interest rates, exchange rates, unemployment and economic growth to varying degrees.

[13]Charles Hitch was the Assistant Secretary of Defense (Comptroller) during the McNamara era.

[14]Charles J. Hitch & Roland N. McKean, The Economics of Defense in the Nuclear Age (New York: Atheneum, 1965).

achieve military objectives. Technology define(d) the possible strategies (and) the economic problem (was) to choose the strategy ... which (was) most efficient ...."[15] "The job of economizing ... cannot be distinguished from the whole task of making military decisions."[16] Hitch and McKean proposed that in determining the size of the defense budget, we should look at broad programs, and not at individual objects of expenditure as these are often interrelated parts of a single system or program.

Bruce Russett, professor of political science at Yale, provided further insights into several other defense spending related issues such as the arms race, the role of alliances, and the role of domestic politics on defense decisions in his book What Price Vigilance?[17] This treatise, inspired by the author's concern for the effects of high levels of military spending on American society, is by far the most complete treatment of the many issues to be addressed by this research undertaking.

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[15]Ibid., 3

[16]Ibid.

[17]Bruce M. Russett, What Price Vigilance: The Burdens of National Defense (New Haven: Yale University Press, 1970).

Russett's main assertions were:

a. Parkinson's Law about the virtual impossibility of disbanding a large organization applies to defense also, being aided in part by a very influential "military-industrial complex."[18]

b. Alliances are inherently plagued by problems of "free-riders". Deterence provided by one member of an alliance for itself becomes entirely a public good for all other members, **although** the attribute of nonexcludability is not entirely met since it can be withdrawn at the eleventh hour by the provider nation.[19]

National Defense Spending[20] by David Olmos is a critique of the more recent defense policies of the Reagan administration, providing a good overview of the many defense spending issues at hand in layman's language.

Franklin Spinney's[21] treatment of the difficulties involved in the making of procurement related decisions in the Department of Defense provides us with some illuminating

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[18]Ibid., 13-15.

[19]Ibid., 93-96.

[20]David Olmos, National Defense Spending: How Much Is Enough ? (New York: Franklin Watts, 1984).

[21]Franklin C. Spinney, Defense Facts of Life (Boulder: Westview Press, 1985).

insights to the predicaments faced by decision makers in coming to terms with uncertainty and the problem of optimal resource allocation. The bureaucratic and political aspects of the decision making process is further elucidated in Robert Beckstead's article, Some Implications of Managing Defense Resources,[22] which also includes sections on the US Department of Defense's budgeting and cost management processes. More on the political-economic aspects of defense spending can also be found in a more recent work by Weida and Gertcher.[23] Their main contention is that the politicizing of defense planning and procurement results in economically inefficient resource allocation.

A good account of the economic aspects of peacetime defense spending is provided by Murray Weidenbaum.[24] The relationship between military and industry, technical research and development, and the role of the military as an employer are addressed at considerable depth in his book.

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[22]Robert W. Beckstead, "Some Implications of Managing Defense Resources", Defense Economic Issues (Washington D.C.: National Defense University, 1982).

[23]William J. Weida & Frank L. Gertcher, The Political Economy of National Defense (Boulder: Westview Press, 1987).

[24]Murray L. Weidenbaum, The Economics of Peacetime Defense (New York: Praeger Publishers, 1974).

The Boston Study Group's 1979 work on The Price of Defense[25] provides yet another systematic analysis of the complex defense spending problem - from threat analysis to a proposal for force structure changes, to the economic and social effects of a winding down of the military.

NATIONAL SECURITY STRATEGY FORMULATION

This is the realm of politics, international relations, national interests, and foreign policies. Much has been written about US interests and policies by authors in the private sector and by official government sources. Extensive references to US interests and policy goals will be used in this study. National Security and American Society,[26] a collection of articles published under the auspices of the National Security Education Program provides a comprehensive coverage of the wide ranging issues and complex processes of national security policy formulation.

With his access to both classified and unclassified sources in the Department of Defense, the Defense Industrial Security Institute, the National War College, and personal

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[25]The Boston Study Group, The Price of Defense (New York: Times, 1979).

[26]Frank N. Trager & Philip S. Kronenberg eds., National Security and American Society (Lawrence: University Press of Kansas, 1973).

contacts with generals, ambassadors, and members of the Executive Branch, Edward L. Creekmore's 1983 doctoral dissertation[27] on US strategic military policy provides a reasonably reliable assessment of the threat against the US and an analysis of some probable precipitants of war.

National interests are the "results" which defense spending seeks ultimately to buy. Donald Nuechterlein[28] suggested the classification of national interests into four categories - survival, vital, major and peripheral - as a useful way to measure how willing we are to pay for the defense of those interests. This classification of national interests provides a basis for our assessment of defense spending.

INTERNATIONAL POLITICS AND THE BALANCE OF POWER

How a nation, out to further its own interests, behaves in the world of international politics is the center of discussion here. Specifically, this study will be concerned with the issues of balance of power, deterrence, superpower politics, and "small-power" politics.

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[27]Edward L. Creekmore, "An Appraisal of Current United States Strategic Military Policy" Ph.D. Diss., Claremont Graduate School, 1983.

[28]Donald E. Nuechterlein, "The Concept of 'National Interest': A Time for New Approaches" (ORBIS 23, Spring 79) 73-92.

Contending Theories of International Relations[29] by James Dougherty and Robert Pfaltzgraff Jr. provides a good insight into the many theories of international relations, their strength and weaknesses. There is also an extensive body of literature whose focus is on the analysis of international relations as games. They are, however, mostly mathematical, and require the reader to have some prior knowledge of mathematical games. Superpower Games[30] by Steven Brams, though still requiring some mathematical skills to read, is a very readable paperback which provides a fairly good sypnosis of the application of game theory to international conflict.

CONCLUSION

From the literature reviewed, there is clearly a need to provide a new approach to analyzing international politics, national security strategy and defense spending. The cost of playing a "game" in international politics and of adopting a national security strategy, the role of threat, and of uncertainty, must be embodied in a single model of defense spending - a model of resource allocation between defense and other economic needs.

[29]James E. Dougherty & Robert L. Pfaltzgraff, Jr. Contending Theories of International Relations (New York, Harper & Row, 1981).

[30]Steven J. Brams, Superpower Games (New Haven, Yale University Press, 1985).

CHAPTER 3

METHODOLOGY

This study is based on a survey of literature and current thinking on defense economics, national security policy and military strategy formulation, the dynamics of international relations, and the special role of alliances.

The study will examine a very complex and expansive subject. Going into detail about all issues involved would result in a multi-volume work. The emphasis in this study is not depth, but scope. Sufficient dimensions of the subject will be covered to provide the reader an awareness of the many issues involved, and how they variously affect defense spending decisions. The reader will be left to make his own conclusions on the magnitude of these effects, as they will, invariably, be highly subjective.

The research question demands that some degree of rationality be demonstrated in defense spending decisions. This paper adopts an economic approach to establish rationality. The method of inquiry herein attempted encompasses a brief survey of the following areas:

a. The Need for Defense. This addresses the nature of defense and attempts, using a reductionist approach, to answer the question "what does defense spending buy", as follows:

i. National interests and sovereignty. These are the pillars on which all defense matters are founded. The discussion will focus on the nature of sovereignty issues and national interests, and how they may dictate the goals and objectives of defense policies and spending.

ii. Elements of national power. A nation is but a player in the international political-economic arena. A nation's national power is its means to influence to its favor the outcome of events in this international arena. The role and buildup of the military element of national power, in particular, will be elucidated.

iii. Threat. As an extension of the "game" in the international political-economic arena, a nation may decide to use force on another to achieve the outcome or favors it desires. A nation may, hence, need to arm itself to deter a rival from resorting to the use of force. This is traditionally the reason for defense spending in peacetime.

iv. Balance of power and deterence. The nature of the "power balance" and deterrence will be analyzed. The dynamics of equilibrium will be discussed.

v. Military power: ends, means and costs. Finally, to tie this first part together, the paper will discuss how, through the process of military strategy formulation, the political goals and objectives of the nation may be realized. This is the point where defense spending enters the picture.

b. Defense Spending and the Resource Allocation Problem. The theory behind resource allocation will be introduced. Traditional defense spending decision models, their strengths and their weaknesses, will also be discussed:

i. Least-cost strategy with exogenously given objectives. This model was first rigorously developed for solving military strategy resource allocation problems by Hitch and McKean[31].

ii. Exogenously pegged to federal budget. This is a simple common sense approach adopted by many governments.

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[31]Charles J. Hitch & Roland N. McKean, The Economics of Defense in the Nuclear Age.

iii. "Minimalist" self-defense-only strategy. This is the approach used by the Japanese, whose defense burden is "shared out" with the United States through a mutual defense treaty.

c. Defense Spending in a Theoretical Framework. Here, the findings from the first part ("what does defense spending buy") will be integrated into a framework of game strategy, risk, and uncertainty. The purpose is to understand the nature of defense spending decisions. This is accomplished by:

i. Reducing national security objectives to concrete tangible policy goals.

ii. Using the transformation process - strategy - and policy goals as the decision variable.

iii. Modeling environmental uncertainty such as the reaction of other "game" players, risks, and threats with a random vector.

iv. Constructing an objective function from the decision vector and the environmental random vector.

v. Applying the theory of choice under uncertainty and risk and game theory as the basis for decision making.

In the present world of coalition politics, military alliances play a very important role in the sharing of the defense burden among nations with a common threat. This study will also address some of the issues involved, and examine the effects these have on the viabilility of the alliance, and their consequences on defense spending.

The end product of this exercise is a conceptual framework with which one may systematically analyze and appraise defense spending decisions.

CHAPTER 4

UNDERSTANDING THE NEED FOR DEFENSE

To understand the need of defense, one must first examine the nature of political intercourse between nations. Nations seek to impose their wills on each other. This is the hypothesis on which Clausewitz's definition of war is based, and upon which the study of international relations is founded. But why do nations desire to impose their will on each other? What are their goals? Why should nations be in competition, or even conflict, with each other, as this seems to imply?

PART I

NATIONAL INTERESTS AND POWER: THE GOALS OF FOREIGN POLICY

POWER, GLORY AND IDEA

According to Professor of Sociology at the University of Paris, Raymond Aron, political units aspire to survive. Leaders and led are interested in and eager to maintain the

collectivity they constitute together by virtue of history, race, or fortune.[32]

Security of the nation state, therefore, underlies all relationships between nations, and is the primary objective of their foreign policies. Security in a world of autonomous states can be based on the weakness of rivals or on force itself. In both cases, a relation of forces is established so that potential enemies, by reason of their inferiority, will not be tempted to take the initiative of aggression.

The relationship between security and force, however, is not an unambiguous one. The maximization of resources (force) does not necessarily lead to a maximization of security. In Europe, traditionally, no state could increase its population, wealth, or soldiers without exciting the fear and jealousy of other states, and thereby provoking the formation of a hostile coalition. There exists, thus, an optimum of forces, which if exceeded would lead to a relative weakening as a result of a shift of allies to neutrality or of neutrals to the enemy camp.

An individual may not always necessarily subordinate all his desires to his desire for life alone. There are

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[32]Raymond Aron, "Power, Glory and Idea", National Security and American Society.

goals for which an individual accepts a risk of death (for instance, mountain climbing in pursuit of adventure). The same is often also true of nation states. This forms the basis of the defense spending model which will be expounded in chapter 6.

Nation states may seek to be strong not just to discourage aggression and enjoy peace, but also to be feared, respected and admired. They seek to be powerful. In strength, the state finds not only a reduced risk of being attacked, but also the capacity to impose its will on others - an end which, for many, needs no further justification.

Much of the tension between nations in the world today revolves around competition over the control of land (resources) and men. To some, the control of the resources is a question of survival, while to others, it is a search for greater power. Although it is possible to argue a case for long-term survival, for most nation states it is more likely a case of survival and power, in varying degrees.

Nation states may, also, sometimes enter into a "war for ideas". For example, the Cold War between the United States and the Soviet Union was one over competing ideologies - Democracy and Communism. During the Cold War,

it was a Soviet policy goal to export Communism to the rest of the world, while the United States adopted a policy of containment to prevent the spread of Communism.

At times, too, nations go to war in pursuit of glory. The pursuit of glory is not merely a desire for power; it is power recognized and revered by others, power whose fame spreads across the world. Glory is seldom the sole cause of a war. More often, it takes the form of a war which has lost sight of its political objectives and degenerated into a pursuit of military victory as a goal in itself.

Nonetheless, security remains the fundamental goal underlying the conduct of all international relations by nation-states. Security, in the context of international relations, has a wider meaning than just the protection of the nation-state from harm. Security includes the protection of all the nation-states' interests.

NATIONAL INTERESTS

The national interests of a state is central to any discussion of its foreign policy because they are used to signal its desires and intentions to other states. For example, the United States' national interests include the survival of the United States, access to resources and

markets in various parts of the world and the promotion of democracy. United States interests in the Middle-East, as a specific example, include Israel's survival and access to supplies of oil.[33]

There is no one single definition of national interest in the literature. National interests are defined by a number of factors, including geography, history, culture, nature of political system, economics, and security issues. Interests may also change over time. It suffices for the purpose of discussion here to define the national interests of a state as its desires and intentions as they relate to the above factors.

The definition of national interest, however, does not give policymakers any guidelines to help identify such an interest. To do this, we turn to a set of four "basic interests" of nation-states, defined as follows:

> Defense interest: the protection of the nation-state and its citizens from the threat of physical violence by another country, and/or protection from an externally inspired threat to the national political system.
>
> Economic interest: the enhancement of the nation-state's economic well-being in relation with other states.
>
> World-order interest: the maintenance of an international political and economic system in which the nation-state can feel secure, and in which its citizens and commerce can operate peacefully outside their own borders.
>
> Ideological interest: the protection and furtherance of a

[33]George Bush, National Security Strategy of the United States (White House, Mar 1990).

> set of values which the citizens of a nation-state share and believe to be universally good.[34]

All of a nation-states' interests fall into one or more of the above categories of "basic" interests.

NATIONAL POWER

Every nation state employs its national power to promote and protect its interests. The power of a state is its ability to persuade, coerce, threaten or compel another state to do its bidding. Generally, the power of a state may be classified into a geographic element of power, an economic element of power, a political element of power, and a military element of power.[35]

The geographic element of power refers to power arising from a state's geographic location, its command of strategic lines of communications and control of natural resources. A state commands a geographic element of power by virtue of

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[34]Donald Nueterchlein, "The Concept of 'National Interest'".

[35]Although often classified as an element of power, national will - the collective will of the people to act - is not an element of power by the definition given earlier. National will, by itself, cannot exert an influence on another nation-state unless through an "instrument" such as an economic or military element of power. In this paper, national will is treated as a "multiplier" which can increase or reduce the effects of the elements of power.

other states' need for access to the controlled lines of communications or natural resources. A state therefore exercises its power by denying or threatening, not necessarily explicitly, to deny access.

Closely related to the geographic element is the economic element of power. The state acquires its economic element of power by virtue of its economic strength and trade. The denial of a supply of resources by resource-rich states may also sometimes be classified as an exercise of economic power. The important distinction, however, between the geographic and economic elements of power is that the latter usually works through the market and seeks to undermine the target state's economy. A major supplier-state of a resource may not just enjoy power through resource denial, but may also exercise economic power over other supplier-states by its ability to manipulate the market with an over supply, and bring economic hardship to the other supplier-states by depressing market prices. Like the major supplier-states, a major buyer-state, too, enjoys considerable economic power over small supplier-states, especially if it has diversified sources of supply and its demand makes up a sizeable portion of the overall demand for the supplier-states' output. The United States, for example, is a significant market for the produce of many

third world developing nations. Through the use of denial or preferential tariff arrangements, the United States enjoys considerable economic power over these developing nations.

Among the elements of power, the political element is perhaps the most difficult to understand. The political process allows states to seek mutual benefits through accomodation without resorting to violence. The political element of power is hence the least antagonistic in nature, and is the prefered and most often used in international relations. The political power of a state is embodied in the state's own domestic political processes, its political culture, international alignments and alliances, and the personality of its political leaders. A state's freedom of action, and thus political power, in an international negotiation is often constrained by its domestic political situation and political culture. This circumscribes what the state can do, and may at times undermine its bargaining position. International alignments and alliances may strengthen a state's position in an international political process by massing support and establishing the "moral high ground". Finally, the personality and skills of individual politicians do play a part, also, in the political power of a state. Often, many conflicts are resolved through a

combination of personal rapport between politicians, sincerity, diplomacy, and clever negotiation skills.

When all else fails, a state may choose to resolve a conflict through the use of violence. Military force is usually used only as a last resort because it is costly in not just resources, but human lives. Traditionally, the role of military power is to **threaten** an opponent with the use of force and to **deter** against his use of force. Many people would therefore argue that it is the threatening and deterence effects, and not the actual use of force, that is important in international relations. Notwithstanding, threats and deterence are effective only if there is a demonstrated willingness to use force when so required. The correct way to view military power, therefore, is not just to include military prowess,[36] but also the national resolve to use violence.

There is a cost attached to a course of action associated with each element of power. For instance, the denial of resources to a belligerent state will result in a lost of income from the sale of those resources. The use of military force, too, may be costly in resources and human

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[36]Military prowess comprises all resources and men required to wage war. It includes also the ability to sustain the war effort, materiel-wise and economy-wise.

lives, and may also put the state's own survival at risk. A state will therefore adopt a course of action only when it determines that the benefits outweigh the costs, and it is able to bear the cost of that course of action.

POWER AND THE PURSUIT OF NATIONAL INTERESTS

There is a cost to the pursuit and defense of a state's national interests. How much a cost the state is willing to bear depends on how much value the state assigns to the pursuit or defense of the particular interest in question. It is useful to categorize the value a state assigns to its national interests as follows:

> Survival issues: The very existence of the nation-state is in jeopardy, either as a result of overt military attack or from the imminent threat of attack. The key to whether an issue is one of survival, or a vital issue, is the degree to which there is an immediate, credible threat of massive physical harm.
>
> Vital issues: Serious harm will likely result. A vital issue may, in the long run, be as serious a threat as a survival issue. Time is the essential difference. A vital issue usually provides a government with sufficient time to seek help from allies, bargain with the antagonist, or take aggressive countermeasures to warn the enemy that he will pay a high price if pressure is not withdrawn.
>
> Major issues. The political, economic and ideological well-being of the state may be adversely affected by events and trends in the international environment which if left unchecked would become serious threats (vital issues). Most issues in international relations fall into this category and are usually resolved through diplomatic negotiations. When diplomacy fails, they can become dangerous, and governments must reconsider how deeply their interests are affected by the event or trend in question. If a government finally decides that it is unwilling or unable to compromise on what it considers to be a fundamental question, it has implicitly ascertained that the issue is a vital

one. Conversely, if negotiation and compromise is deemed the best course of action, then the issue is probably a major, and not vital, one.

Peripheral issues. The well-being of the state is not adversely affected by events or trends abroad, but the interests of private citizens and companies operating in foreign countries are endangered. To the extent that the loss of some of the large companies abroad may adversely affect the domestic economy, governments may sometimes treat such issues as major ones.[37]

The ability to assign value to interests is key to the development of a defense spending model. The above categorization of a nation-state's interests provides a broad but convenient measure of how resolved a nation-state is to securing its various interests, and how much it is willing to pay to do so. The difficulty with such a measurement, however, is the question of who decides which category an interest should fall into. In practice, the decision is made by government policymakers. But so are all decisions of the state as a collective. The assumption henceforth in this paper, then, is that policymakers' decision is a reflection of the wishes and will of the people as a collective. This should largely be correct for the case of a popularly elected government.[38]

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[37]Ibid.

[38]A critique of group (collective) decision making is beyond the scope of this paper.

PART II

CONFLICT, BALANCE OF POWER,
DETERRENCE AND WAR

INTERNATIONAL CONFLICT

International conflicts exist because one state is unhappy with what another state is doing or is planning to do. A conflict can therefore be thought of as a sequence of attempts by one state to influence another to do or not to do something. When an interest of a state is threatened, it responds according to whether it a survival issue, a vital issue, a major issue, or a peripheral issue. In the extreme case of a survival issue, an almost immediate military response will be initiated. In a less critical case when it is either a vital, major, or peripheral issue, however, more options are opened. There is often time and, possibly, ground for compromises where diplomacy and negotiations may be put to work.

The decision to use the military element of power to address a survival issue is almost trivial. For vital, major, and peripheral issues, though, there is an array of options open to the state. The state may decide to take a direct counteraction to reduce the threat, or to enter into negotiations with the antagonists. When adopting the latter course of action, however, the state may also initiate

actions aimed at signalling its resolve, or strengthening its bargaining position at the negotiations. For example, in 1971 the United States was faced with growing balance-of-payments difficulties which threatened to deplete its gold reserves. In response, it implemented a direct counteraction in the form of a ten percent surcharge on imports. This slowed the depletion of the reserves. The same action also signalled to its trade partners its resolve to force their acceptance of a devaluation of the dollar.

Regardless of whatever courses of action belligerent states may choose, a conflict in interests can, by definition, only be resolved when at least one side agrees to a compromise. When no compromise is forthcoming from either side, diplomacy fails. Both sides may then resort to other means to resolve the conflict. If the issue is grave enough (sufficiently vital) and the benefits exceed the costs, a state may decide to use its military element of power to resolve the conflict. If the issue is not sufficiently vital, on the other hand, or when the gains do not justify the use of force, the state may decide to back down and make the few compromises which will eventually settle the conflict. Any one issue may not always be of identical importance to the different sides in a conflict. The side who places a lower value on an issue may, in fact,

be willing to make a compromise on that issue. Sometimes a state may also make compromises on an issue if it is unable or unwilling to bear the cost of pursuing its interests on that issue. A state involved in a conflict will therefore seek to enhance its bargaining position by attempting to persuade its antagonist that the issue in question is vital to its interests and it is willing to pay a high cost to defend it; while at the same time try to convince the opponent that the cost to him defending his interest is unbearably high. For example, a state may deploy its armed forces to demonstrate that the issue in question is of vital interest and it is prepared to fight to defend that interest. The same action also serves to signal to the opponent the high cost that it must incur to defend its interests. In lesser extremes, states may exploit their political, geographic or economic elements of power to enhance their bargaining position.

CONFLICT RESOLUTION AND THE FALLACY OF MAKING THREATS[39]

The theory of inflicting pain on an adversary rests on the premise that it will change its mind in order to avoid further pain. It is probable, however, that the greater the

[39]Roger Fisher, "Making Threats Is Not Enough", National Security and American Society.

costs we impose on our adversary, the greater will be the amount they will regard themselves as having committed to their course of action - the "having gone so far, we cannot quit now" mentality.

Inflicting pain on an adversary government is likely to be a poor way of getting them to change their mind. The government whose mind we want to change would have anticipated some costs when it decided to do what we do not like. The costs anticipated were not sufficient to deter it. For us to inflict pain is to act as expected and is therefore hardly likely to cause a reverse of position.

A decision to threaten and the later decision to implement that threat if the adversary fails to respond as we wish are two quite different matters. A threat seeks to influence the adversary with the risk of unpleasant consequences. The execution of a threat, however, may have little purpose other than purely to validate the threat. Take the case of American nuclear deterrent strategy, for example. American nuclear weapons are primarily intended to deter against a Soviet nuclear attack. The implied demand is "do not drop bombs on our territory", and the implied threat is "if you do, we will retaliate in kind". Thus, if deterrence fails and, hypothetically, a <u>single</u> bomb is

dropped on an American city, the United States would presumably go to war. But what would the purpose of the war be? To avenge the attack? To occupy the Soviet Union? To seek an apology? To seek compensation? To change the Soviet leadership? Or just to maintain the credibility of the threat? The purpose in executing a threat after it has failed is not always immediately clear. The execution of a threat following its failure may not always necessarily be the best course of action.

Making a threat is an attractive option because the postponed costs are not immediately evident and, if the threat is effective, a favorable outcome is achieved at little cost. The real cost of making a threat appears, however, when the threat fails to achieve the desired effect on the adversary. When a threat fails, a government has to decide on one of two options: either implementing the threat, or not implementing the threat. Failure to implement the threat may result in a loss of credibility, and undermine the long term ability of the state to influence others. The cost of implementing the threat, on the other hand, is also likely to be high. Assuming that the adversary is rational and has worst-cased the situation, the failure of a threat is likely to be an indication that he is prepared for the consequences of defiance (an execution of the threat).

Therefore, before making threats a government should look ahead to a situation in which a threat has failed to exert the desired influence. The future option to bluff or implement the threat is not as open a choice as it appears. Thus, many people tended to treat a decision to threaten as a decision to implement the threat even though these are analytically different decisions. Treating a decision to threaten as a decision to implement is unsatisfactory, especially when the threat is to do something for an indefinite period, such as the severing of diplomatic relations in response to some one-time action. Nonetheless, the making of threats by nation-states continues to play an important role in international relations.

DETERRENCE AND THE USE OF FORCE

The threat of war has always been an instrument of diplomacy by which one state deterred another from doing something of a military or political nature which the former deemed undesirable. The theory behind deterrence is that a would-be aggressor is dissuaded from conducting a hostile act by a threat of massive and violent retaliation. The would-be aggressor is persuaded to believe that the cost to him would be unbearably high. Deterrence is characterized by both a demonstrated willingness to act when provoked and the capability to do so.

Nation-states arm to deter others from aggression and to defend when attacked. Some arm in order to use force on others. In either case, nation-states aspire to inflict a heavy cost, if not defeat, their opponents in an armed conflict. It follows that all nation-states must desire to have military power that is at least equal to their foes or any likely foes.

Peace depends on there being a balance of power between or among belligerent states. Military parity ensures that no aggressor can expect to make any significant gains without facing formidable odds and incurring unbearable costs. Military parity alone, however, is insufficient to guarantee that force will not be used. The many insurgent movements around the world today, having taken up armed struggles against better trained and equipped military forces, is a clear enough example of armed conflicts occurring despite the odds and costs. When sufficiently vital or survival issues are at stake, military confrontation may take place regardless of the odds and costs.

INFORMATION AND IRRATIONALITY

The assumption of rationality used in the analysis of international relations is often criticized as one that is

not always valid. Is the example of armed insurgencies therefore a case of irrational behavior? In behaviorial sciences, it is usually tempting to assume away deviations from the prediction of a model as irrational behavior or an inadequacy of the model.

Rationality is axiomatic. All nation-states always act according to what they perceive (as opposed to someone else's perception) to be in their own best interest. Not often explicitly stated in models of international relations, however, is the assumption of "perfect information". This turned out to be a very crucial assumption.

Information is the basis on which all decisions are made. Nation-states do not always have access to the same information, or even have a similar interpretation of the same piece of information. Perceptions are different among different nation-states. Hence, it is perfectly acceptable and explicable if **A** thinks he can defeat **B** in an armed encounter and proceeds to engage **B**, when in fact **B** is better trained and equipped, and is almost certain to win any armed encounter. Thus, due to the lack of information available (or misinformation) to **A**, he may not perceive that **B** is significantly better trained and equipped. **A** may have

underestimated **B**'s capability and overestimated his own. Counterintelligence efforts, psychological warfare, and cover and deception make it all the more difficult to discern between reality and falsehood. Therefore, it is perfectly rational for **A** (from his point of view) to engage **B**, although from the information **B** has, **A**'s decision is an irrational one.

PART III

MILITARY POWER

Military power is but one of the elements of national power used by nation-states in the conduct of international relations. Military power is different from the other elements of power, however, in that it's use by one state on another threatens the survival of that other state. The key difference is the degree of harm that military power can potentially inflict. The cost to a state for using military power to resolve a conflict depends, besides the capability of its own military power, also on the military capability of the state against which the power is directed. The stronger a state's military force is, the harder and costlier it would be for its opponents to achieve victory

from the use of force. Herein lies the rationale for defense spending during peacetime. If a nation-state does not have a credible military force, its opponents are likely to be less restrained in their use of force to impose their will on the state.

ALLIANCES

Some nation-states, constrained by the availability of resources (financial or otherwise) and bound together by a common interest, may decide to pool their resources to establish a common defense in the form of an alliance. NATO and the US-Japan Mutual Defense Treaty are examples of such alliances formed for the purpose of military defense. Alliances allow states to establish a stronger deterrence against aggression than they would otherwise be able to alone.

Alliances, however, are not without their problems. Interoperability between multinational forces is only one of the many problems in multinational military operations. Problems with intelligence sharing is another. A discussion of these military-related problems is beyond the scope of this paper. Fortunately though, these problems are not insoluble, and history has demonstrated that multinational coalition warfare is possible (for example the Normandy

invasion of World War II, and the more recent multinational force which expelled Iraqi troops from Kuwait).

Alliances are also plagued by the problem of free-loading. A freeloader is one who enjoys the benefits without paying the price. The security provided by an alliance is a public good for all members. All members enjoy the same amount of security regardless of how much each contributes to the alliance. There is an incentive, therefore, for members to contribute a minimum to the alliance. Solidarity within an alliance is undermined by members who persisted in not carrying what is perceived as their fair share of the burden.

An even more serious problem is the fragility of the political will which holds the alliance together. Actions of all nation-states are always guided by their own interests. Alliances hold together because there are common interests among the members. But interests among states are seldom identical, and they may even sometimes be in conflict. Only where the interests meet can unity of action be assured within the alliance. A member cannot count on getting the full, unqualified support from the alliance if an interest that is not commonly shared among the members is threatened. Often, however, some "token" support is given,

just to signal to the world that the alliance is alive and well. Nonetheless, in so far as there is some common interest, alliances remain an attractive option for nation-states to establish a deterrence against threats to those common interests.

MILITARY POWER: HOW MUCH IS ENOUGH?

The military element of power of a state is a direct function of, or even synonymous with, the war-waging capability of its military machinery. Economic power, on the other hand, is a by-product of successful economic development, and equates to an improvement in the quality of life within the state. Unlike economic power there is little direct utility to be had from military power except from the conduct of international relations in the manner already discussed.[40] Due to the costs involved and the low utility in return, the military capability a nation-state should have is often a very hotly debated issue among its domestic policymakers.

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[40]Some may argue that building a military creates jobs, and generates growth in defense-related industries which creates even more jobs. Except in the case of massive unemployment, this is a bad argument. There is an opportunity cost to the use of the nation's limited resources. When resources are used to build the military, the cost to the nation is all the other things which could be had had the resources been used otherwise.

THREAT AND MILITARY POWER

The military is required to provide security against threats to the national interests of a state. It is therefore logical that how much a military capability is required depends on the threat. The military must be able to deter an adversary from using force by making him believe that the costs to him would be high and the odds of his winning would be low. When violence breaks out, the military must be able to defeat the aggressor. This is, in essence, the primary mission of most military forces in the world today.

By definition, any state can conceivably be a threat to another's interests. It is unlikely that a state will have the resources to have a military to defend against all possible threat scenarios (threat from each different state or combination of states). It is therefore necessary for a state to prioritize its interests and threats. Not all interests are necessarily vital. Some may be just "nice to have". Interests may be prioritized according to whether they are survival issues, vital issues, major issues or peripheral issues. Not all possible threats are necessarily potential[41] threats. The possibility of threat from a

[41]This is a threat deemed likely to deteriorate into armed hostilities should conflict arises, given the current state of international relations and the absence of a military counterbalance to deter the use of force.

"friendly" state is less likely than one from a "less friendly" state. The current state of diplomatic relations and rapport ("friendliness") between states is often an indicator of the likelihood of armed hostilities breaking out between the states. A state will assign a higher priority to the defense against "less friendly" states. A relatively less likely threat may, however, sometimes be given a higher priority because of the degree of harm it can potentially do.

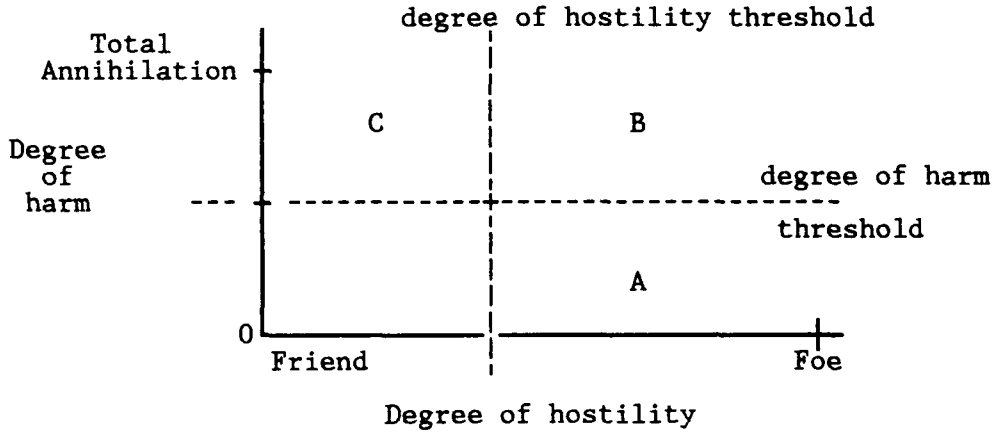

Figure 1. Threat Perception - A simple conceptualization.

Figure 1 shows how the threat perception by one state of another may be represented on a two-dimensional map - with the horizontal axis measuring the perceived degree of hostility, and the vertical measuring the degree of harm the threat is capable of inflicting. While it is at least conceptually possible to measure the "degree of harm" (by

analyzing the elements of power of a threat), the same cannot be said of "degree of hostility". The state of relations between any two nation-states depends on the actions of both states. For instance, a state may be compelled to be "friendly" to another because the latter has more superior economic and military power. It is unsatisfactory to characterize how friendly or unfriendly one state is to another by strictly looking at the status of their diplomatic relations. More correctly, therefore, one should look at the "degree of potential hostility", which is characterized by the fundamental and incompatible differences in national interests between states. The "degree of hostility threshold" marks the point beyond which the fundamental and incompatible differences are large enough for a hostile state to contemplate seizing any profitable opportunity to use force, when such opportunities arises. The "degree of harm threshold", on the other hand, is the amount of "damage" the state is willing to risk.

The above synthesis enables a state to characterize all possible threats to its interests as points on the "threat perception map". The "map" is divided into four distinct quadrants (see figure 1). Threats represented by points in quadrant B are both probable and dangerous. The state must plan for its military to meet all these threats. Quadrants

A and C are the "caution" area, threats the military need not meet. Threats corresponding to points in A are probable, but deemed to be not dangerous. It is incidental if some of these threats are taken care of by the very same actions required for threats classified in B. Threats corresponding to points in C, however, are dangerous but improbable. They must, nonetheless, be closely monitored because of the potentially great harm they can do.

The threat situation facing a nation-state is not static but is continually changing. The "threat perception map" must therefore be continuously updated, and the military must constantly adjust to meet the changes. The capabilities of a threat military, and therefore the "degree of harm" of that threat, often do not change abruptly. It takes time to acquire new military hardware and train new soldiers. Through peacetime intelligence collection efforts, it is quite possible to make rough but indicative assessments of capabilities of the possible threats, and therefore preempt changes in the threat situation arising from increases in "degree of harm" (threats moving from quadrant A to B) and take the necessary corrective action. However, movement of threats from quadrant C to B is likely to be more sudden, or at least occur in a shorter time than is required to make the necessary corrective adjustments to

the military. Hence, even under the strict assumption of perfect information, the long lead-time needed to take corrective actions, relative to the speed of change in the threat situation, makes the state vulnerable to sudden political changes, especially if the threat has vast military power. To deal with such political uncertainty, nation-states may either plan for the worst-case, or seek an alliance to provide the counterbalance.

STRATEGY AND DEFENSE PLANNING

The assessment of interests and threats precedes defense planning. Having identified the interests and threats, the next logical step is to develop a strategy to defend the interests against those identified threats. For the purpose of this paper, strategy is defined as

> ways of using budgets or resources to achieve military objectives. Technology defines the possible strategies. The economic problem is to choose that strategy, including equipment and everything else necessary to implement it which is most efficient ...[42]

Defining the problem as one of selecting the strategy which maximizes security with the given resources is both misleading and unsatisfactory. One cannot prepare defense plans on the basis of need alone. There are few, if any, needs that should be met regardless of cost. The trade-off

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[42]Charles J. Hitch and Roland N. McKean, The Economics of Defense in the Nuclear Age, 3.

is between the risk one is willing to bear and the price one is willing to pay. The problem should therefore be to maximize the sense of security one feels vis-a-vis the satisfaction foregone from the other things which could have been bought with the resources spent on defense. Chapter 6 will expand on this theme and develop a systematic way to analyse this very complex problem.

NON-VIOLENT MILITARY POWER

Military power need not always equate to a threat or application of violence. Although the threat or use of violence (as defender or aggressor) is the primary reason for military power, policy objectives may sometimes be attained with military power in a non-violent way. This is especially so in the context of alliances and military assistance (in the form of hardware sales or training assistance). For example, a powerful member of a military alliance may sometimes solicit favors from smaller members, exacting compliance through the effects it's actions have on the alliance, and therefore the smaller member states. Sales of military hardware and training assistance are also used in similar ways. The Soviet Union, for example, by controlling the supply of spare parts for its military hardware sales, enjoys significant influence over buyer

states. Hence, when applied judiciously, military power can also be used to influence "friendly" nation-states.

SUMMARY OF MAIN POINTS

The conduct of international relations by each nation-state is guided by its national interests. Nation-states need to spend on defense because they desire security in a world of conflict, conflict characterized by the pursuance of national interests which are not always compatible.

There is a role for military power in peacetime. A balance of power between states discourages the use of violence by any one state to achieve its ends by making the cost of doing so unbearably high.

The defense of the state's national interests is a need which must be satisfied from the states' limited resources. The trade-off is one between the risk of destruction from a military attack and the opportunities foregone as a result of the use of the resources for defense.

CHAPTER 5

RESOURCE ALLOCATION

AND

DEFENSE SPENDING DECISIONS

THE RESOURCE ALLOCATION PROBLEM

The problem of resource allocation arises because resources are scarce, which makes it essential that they are both fully and efficiently employed. If they are not, the potential of the economic system to generate welfare cannot be fully realized. The principle underlying resource allocation, therefore, is the maximization of welfare.

The analysis of resource allocation is concerned with the question of what goods are produced and in what quantities; what methods are used in production and with what factor inputs; and how goods are distributed among customers. In the case of defense, the good produced is security, while the methods of production can be thought of as the defense strategy.[43]

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[43]Definition on page 53.

The standard analysis used for evaluating the efficiency of resource allocation is based on the rule, associated with Italian economist Vilfredo Pareto, that economic welfare is increased if one person is made better off and no one is made worse off. Similarly, welfare is decreased when one person is made worse off and no one better off. It follows, then, that an optimum is reached when no one person can be made better off without another being made worse off. This is called the Pareto optimum. The rule does not prescribe how an increase in welfare is distributed. An increase in welfare occurs so long as one person (<u>does not matter who</u>) is made better off, and everyone else is at lease <u>not</u> worse off. Nonetheless, Pareto optimality is a useful way to characterize efficient resource allocation. An allocation is efficient, therefore, if no one person can be made better off without another being made worse off by a reallocation of the resources.

A production optimum occurs when it is impossible to increase the production of one good without decreasing that of another, given the state of technology. At the production optimum, all resources are fully employed and aggregate production is at a maximum. The composition of the aggregate product (the exact quantities produced of each

good), however, is indeterminate. There is an infinite number of Pareto optimal mixes of goods that can be produced by using the given resources in different combinations. At a Pareto optimum, the rate at which one good must be given up[44] in order to be able to produce an additional unit of another is called the marginal rate of transformation between the goods.

An exchange optimum occurs when it is impossible to make one person better off without making another worse off by exchange.[45] The exchange optimum is Pareto optimal, and there is an infinite number of such optima corresponding to the different ways in which goods can be divided among the population. Unlike the conditions for a production optimum, which depends on the state of technology and the amount of resources available, there is no similar tangible entity from which one can associate with the exchange optimum. Critical to the existence of an exchange optimum is the concept of preference. Preference may be an uncomfortable concept for readers unused to the behavioral sciences.

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[44]By definition, at a Pareto optimum, no one good can be increased without reducing some other.

[45]An exchange occurs when a person trades part of his current possessions (may be in the form of money) for something which he either desires more of, or which he is currently not in possession of.

Preference is a state-of-mind that is not "measurable" until the individual chooses to "reveal" it through his actions. Preference may be inferred from an individual's actions in the market - his willingness to exchange.

The marginal rate of substituition (MRS) between any two goods is the rate at which an individual is willing to exchange one good for the other with no loss in welfare. Obviously, for exchange to actually take place, an individual must be at least as well off after the exchange as before it. To illustrate how exchange will take place, consider an individual A who is willing to trade four oranges for one apple and vice versa (ie. MRS of four oranges for one apple), and an individual B with an MRS of two oranges for one apple. This means that A is equally happy to have four oranges less in exchange for one apple, and B is also at least as well off to lose one apple in exchange for two oranges. Clearly, by exchange, B is made better off by losing one apple to A in return for four oranges, two more than what he expects to gain from the lost of one apple. A, on the other hand, is not any worse off since he got his one apple in exchange for four oranges. It follows, therefore, that the MRS of individuals must be equal at the exchange optimum, otherwise at least one person can be made better off through exchange without making anyone else worse off.

Essential to the understanding of exchange, also, is a concept known to economists as "law of diminishing marginal returns". The "law" is best explained with an example. Consider now, an individual in possession of 20 apples and three oranges. He is willing to trade five apples in exchange for an orange. Suppose the exchange is effected and he now has 15 apples and four oranges. The "law of diminishing marginal returns" predicts that he will now only be willing to trade for an orange with less than five apples. That is to say, as the quantity of apples in his possession falls, the value of each apple to him increases. Thus if he is left with only two apples, he can only be induced to part with an apple in exchange for a considerably large quantity of oranges. Conversely, with only three oranges in his possession, he was willing to part with a considerable number of apples in order to acquire more oranges. When his possession of oranges increased, however, he became less willing to "pay" (by losing apples) to acquire more oranges. With few exceptions (defense is <u>not</u> one of them), the law of diminishing marginal returns generally applies to the consumption of all economic goods. When one gets more and more of a good, each additional unit is generally worth less to the individual than the previous. The implication for resource allocation is that, to maximize

welfare, the additional dollar must be spent on the good with the highest return (value) at the margin.

Production optimality only assures that technically resources are efficiently used. To determine the actual allocation of the different resources and, therefore, the quantities of the various goods produced, production optimality must be matched with exchange optimality. Overall optimality occurs when the relative quantities of goods produced matches the mix required for exchange optimality. This happens when the marginal rate of transformation between any two goods equals the marginal rate of substituition between the goods. The condition guarantees that only what is required is produced.

The significance of the condition for overall optimality (marginal rate of transformation between any two goods equals the marginal rate of substituition) is that for optimal resource allocation, the relative quantities of goods produced must correspond to the relative value consumers place upon them.

DEFENSE SPENDING DECISIONS

Hitch and McKean cannot be more correct when they said that the issue of defense spending is not a question of

"what can we afford for defense" or "what are our needs" but "how much is needed for defense **more than it is needed for other purposes**".[46]

Having hit on the key issue, it is surprising that Hitch and McKean failed to expand on this theme. Like many authors, Hitch and McKean chose, instead, to use the "cost effectiveness" approach to analyze the defense spending problem. Such an approach is satisfactory when it is for the purpose of cost accounting, budgeting, and resource allocation within the Department of Defense. For resource allocation at the national level, the cost effectiveness approach is inadequate.

It is not the intent here to discuss the formulation of military strategy, or what constitutes a sound strategy. It suffices to say that the cost effectiveness approach helps defense planners to develop a minimum cost strategy which is able to meet defense needs. From an economic resource allocation point of view, however, cost and need are not independent entities. There are no needs which must be satisfied regardless of cost. This is especially evident when the cost is expressed in terms of things which could

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[46]Charles J. Hitch & Roland N. McKean, The Economics of Defense in the Nuclear Age, 48.

otherwise be had. The cost to the United States for deploying one Army division in Europe may, for instance, be 60 new schools which could have otherwise been built. Because of diminishing returns, a stage will be reached where it is no longer desirable (as deemed by the citizens as a collective)[47] to spend additional dollars on defense.

The cost effectiveness approach may be thought of as a solution to the production optimality problem. Cost effectiveness only ensures technical efficiency, and is therefore not sufficient for overall optimality.

Because the "traditional" cost effectiveness approach does not help solve the resource allocation problem for policymakers at the national level, a simple historical based rule of thumb is often used to decide the amount of the national budget to be apportioned for defense. Although of little academic value, this approach is simple and practical. In practice, most states adopt the "cost effectiveness" approach, while using some historical rule of thumb to maintain "reasonableness".

In the extreme case where a state relies on an alliance to satisfy its defense needs, the state may choose to spend

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[47]A discussion of what constitutes a "collective decision" is beyond the scope of this paper.

only a "minimum" on defense. This extreme case may happen when the state has complete faith in its allies' responsiveness to its needs. When this happens, the state may spend an amount just sufficient to convince the rest of the alliance that it is contributing its "fair share", and the state becomes virtually a freeloader.

TIME FOR NEW APPROACH

If the underlying problem is "how much is needed for defense more than it is needed for other purposes", then it seems that all the current approaches to the analysis of defense spending are unsatisfactory. While economists have, variously, dwelt on the subject of optimal resource allocation, they are nominally theoretical and, at best, non-specific.

The approach outlined in chapter 6 is an attempt to move beyond the pure, non-specifics of resource allocation theory towards a specific theory concerning the problem of resource allocation at the national level and, in particular, of that pertaining to defense.

CHAPTER 6

DEFENSE SPENDING:

AN INTEGRATED APPROACH

One cannot justify defense spending simply on the basis of need alone. The preceeding chapters would have attested to even the skeptic that there is a need for defense spending during a period of peace. But when it comes to the question of what the appropriate amount of spending ought to be, however, little agreement can be found. There never will be. The analysis of the defense spending problem below will make this clear.

The analysis begins with the formulation of a government resource allocation decision model to provide the framework for a systematic examination of the multitude of issues involved. This will be followed by a discussion of the government programs' prioritization process. The analysis then narrows toward defense specific issues, starting with the utility of defense to the defense spending decision criteria.

THE RESOURCE ALLOCATION DECISION

Utility is a concept used in microeconomic theory to explain consumer behavior. Crudely, utility may be thought of as the "quantity of satisfaction" that a person derives from the consumption of an economic good. Utility increases with the quantity of goods consumed. Hence, a person enjoys greater utility when he consumes three apples than if he were to consume two.

Consider now three different basket of goods, **A**, **B** and **C**, whose composition is as follows:

A: 3 apples, 2 oranges and 1 pear

B: 3 apples, 2 oranges and 2 pears;

C: 2 apples, 2 oranges and 2 pears.

An individual will, clearly, prefer basket **B** to **A** since both have an equal number of apples and oranges, but **B** has one pear more than **A**. By a similar argument, **B** is also preferable to **C**. Between **A** and **C**, however, it is less clear which is preferable to the individual. The choice between **A** and **C**, thus, must inadvertantly involve a judgement which depends on the taste and preferences of the individual making the choice.

U(x) is a utility function if

U(**B**) > U(**A**) <==> **B** is preferred to **A**

The utility function of an individual is an expression of his preferences. It is implicitly assumed that the individual is conscious of his preferences and "he knows what is best for him". The problem of the consumer may be expressed as one of choosing the "basket of goods", from among the possibilities circumscribed by his budget, which maximizes utility.

Let $\underline{v} = (v_1, v_2, v_3, \ldots v_n)$ $\qquad v_i \in \{0,1\}$ for all i

be a vector representing an array of government programs; each i (in v_i) corresponding to a specific social welfare, development, economic, defense or other government-related program. Without loss of generality, a program is assumed to be the lowest level possible entity which the government can assign budget resources. For each program (i), therefore, the decision required is either a "go" (v_i=1) or "no-go" (v_i=0).

Suppose each program (i) costs an amount p_i. If one assumes non-satiation, and government spending is restrained by a budget constraint,[48] then

[48]The existence of more wants than there are resources to satisfy them is sufficient to guarantee non-satiation and make the budget constraint binding. A discussion of the use of the government budget (budget surpluses and deficits) as an economic management tool is not included here, but the interested reader will find ample coverage of the subject in most undergraduate level macroeconomic textbooks.

$$V = \{\underline{v} : \underline{pv} = B\} \qquad \text{where } \underline{p} = (p_1, p_2, p_3, \ldots p_n), \text{ and } B = \text{government budget} \qquad \ldots[1]$$

prescribes the set of possible combinations of programs which the government could afford based on its budget, B. Suppose, also, that there exists a utility function

$$\Omega = \Omega(\underline{v}),$$

then, the budget allocation decision facing government policymakers may be represented by the following optimization problem:

$$\max_{\underline{v}} \Omega(\underline{v})$$

$$\text{subject to:} \quad \underline{pv} = B$$
$$v_i \in \{0,1\}, \text{ all } i=1\ldots n \qquad \ldots[2]$$

The budget constraint [1] prescribes the set of possible combinations of programs which the government could afford based on its budget. The decision for the government, therefore, is to choose that combination of programs which maximizes utility.

Enumerating the solution is a purely mathematical exercise once the problem is sufficiently well defined in the form depicted in [2]. The focus of the analysis here, however, is not on the solution to the problem but on its formulation and the robustness of its conception. It is to this that the analysis will turn its attention next.

THE GOVERNMENT UTILITY FUNCTION

The utility function, $\Omega(\underline{v})$, is key to understanding the nature of the government resource allocation problem. But whose utility function is $\Omega(\underline{v})$, and whose preferences does $\Omega(\underline{v})$ represent?

One man's meat is another man's poison. Indeed, every individual will have, to a some degree, a unique set of preferences. Even among the state's policymakers, one can expect each to express, if only slightly, different preferences which may or may not affect the decisions which they make as a collective. The collective decision is a result of group dynamics within the policymaking body. But can a group decision, representing compromises made within the group, be optimal in any sense of the word? The answer is yes, by application of the Pareto criteria.[49]

It is often convenient to think of $\Omega(\underline{v})$ as the government utility function representing the preferences of the people, expressed through governmental representation, with regard to government policies. This should largely be true in a democratic state with representative government.

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[49]A discussion of the problems associated with such an assumption is beyond the scope of this paper. A detailed discussion of social welfare (collective utility) functions can be found in The Allocation of Resources, pp. 48-67.

Some will argue, though, that this need not always be the case. The free availability of information is a necessary condition for the coincidence of preferences between government and the people it represents. The set of information on which government policymakers rely to make decisions, however, may not always be available to the general public (especially security and defense related information). When they are, they usually become available through government sources, and may sometimes be distorted, intentionally or otherwise. The lack of information provides scope for a democratic government to deviate from decisions which are truly representative of its people's wishes.

One must be aware that an analysis of government spending decisions must inherently be subjective since the decisions are based on the preferences of the decisionmakers. The analysis will also be undermined by the incompleteness of information. Such are the limitations to a systematic analysis of defense spending.

THE VALUE OF DEFENSE: HOW MUCH IS DEFENSE WORTH?

The return from money spent on a social welfare or road building program is usually direct and tangible enough for the appreciation by an average man-in-the-street. But what

does the taxpayer get in return for defense spending and how much is it worth to him? Notwithstanding the limitations discussed in the preceeding section, the analysis cannot proceed without a discussion of the utility of defense to the consumer, on whom the burden of defense must ultimately fall.

Most economic treatment of defense issues today generally adopt security as the economic good purchased with defense spending. Security is meaningful only when it is used with reference to the interests of the state and the threats to those interests - ie. what is it that is being secured, and against whom or what threat is it being secured? How much security, and therefore defense spending, is worth depends on the worth of the interests in question.

More correctly, the utility (or worth) of security to a state depends on the utility of its national interests and its outlook of the future.[50] Formally, this may be expressed as:

$$\text{utility of security, } U = U(x,y) \quad ...[3]$$

$$\text{and} \qquad \frac{\delta U}{\delta x} > 0 \ , \ \frac{\delta U}{\delta y} > 0$$

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[50]Though used in a different context here, this is mostly consistent with the Expected Utility model of war developed by Bueno de Mesquita in The War Trap (New Haven: Yale University Press, 1981).

where **x** is the utility of the state's national interests, and **y** is the expected utility[51] of the outlook for the future. The assumption implicit in [3] is that it is possible to represent the collective utility of the state as if it were a single person.[52] In the context of a democratic state, the assumption will largely be valid.

The utility of the national interests (x) may be indexed in the manner discussed in chapter 4.[53] The perception of worth (utility) can usually be reduced to a comparison of tangible outcomes which affect the way of life in the state. Access to oil in the Middle East and the promotion of democracy among nations of the world, for example, are two expressed interests of the United States. How much each interest is worth, and how much the United States is willing to pay to further those interests, will depend largely on how the lost of each will affect American way of life. A loss of access to oil is likely to have a greater immediate impact on Amercian way of life than a

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[51]The utility of outlook for the future is a "probabilistic" variable which depends on uncertain future events. The mathematical expectation is a useful construction for the analysis of uncertain events. See section on "Dealing with Uncertainty" (pp. 79).

[52]See note [49].

[53]pages 35-36.

state turning communist in sub-Sahara Africa. The United States is likely to be willing to spend more resources in securing access to oil than in the promotion of democracy in sub-Sahara Africa.

It is meaningless to talk about the value of security without mention of the conditions and outlook for the state following a war. The defense spending decision problem is trivial if the utility of security were simply a function of national interests. It is the outlook for the future element of the utility function (U) which makes the defense spending decision a problem of intertemporal choice, characterized by uncertainty. One can expect that the more grim the outlook is, the greater will be the value of security to the state. A grim outlook for the future may mean more than just the lost of its national interests. The outlook for the future depends on, among other things, the number of potential adversaries, the probability of war breaking out, the probability of winning the war, the extent of war damage, the post-war policies of adversaries, the international political climate, and socio-economic factors such as refugees and migration (human and capital).

The probability of war breaking out, or likelihood of war index (π), may be functionally expressed as:

$$\pi = P(\underline{af}, \underline{b\tau}, \underline{\beta}) \quad \ldots [4]^{54}$$

The force correlation factor, f_i, ($f_i = \frac{f_i}{f_0}$: f_i= adversary, f_0=own) is a measure of the combat power of an adversary (i) armed force relative to one's own.[55] It is often used by defense planners as **an indication** of the cost and probability of success of a planned military operation. An adversary is therefore more likely to pursue a military option if the force correlation factor is in his favor than if it is not. The coefficient a_i, may be thought of as the subjective probability of success for the adversary, given f_i, <u>as perceived by that adversary</u>. It embraces his attitude toward risk as well as his ethno-moral background and propensity for violence.[56]

Apart from the costs and odds of victory as indicated by force correlation factors, the **absolute cost** which an

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[54]Underlined characters (eg. $\underline{f}$) are vectors. An element of a vector is represented without an underline (ie. $\underline{f}$ is an element of vector $\underline{f}$). The elements of a vector correspond to aspects of the different nation-states (own and/or adversary).

[55]f_0 may include <u>reliable</u> allies, in the case of the state being a member of an alliance.

[56]Societies differ in their attitude towards the use of violence. Some societies do not advocate the use of violence to resolve conflicts, and will only fight when attacked; while others may, by choice, assume the role of initiator of violence.

adversary incurs may also affect his decision. This is evident in the example of nuclear deterrence. It is largely immaterial whether the United States or the Soviet Union succeeds in convincing the other of its capability to **win** a nuclear conflict. The absolute amount of damage each, victor and loser, will suffer in the process of such a war, alone, is a deterrence. The effect of such costs on an adversary is captured by the second parameter $b_i\tau_i$. The cost to the adversary (i) depends on, τ_i, the amount of damage that can be inflicted on the adversary (which is proportional to f_0) and the extent to which he can reduce the damages. The coefficient b_i provides a convenient mapping of costs to a "pain tolerance" index of the adversary. The likelihood index (π) increases with f and decreases with τ.

The observation that **absolute cost** alone can convince an enemy against the use of force is significant. If absolute cost is sufficient to achieve deterrence without the need to have the capability to completely destroy (ie. total defeat of) an enemy, then the phenomenon of an arms race may eventually come to a halt. Unfortunately, the progress in counter-weapon technology, while serving the noble purpose of preserving life, reduces the absolute cost of waging war, and prevents it from ever reaching the high

levels required to deter war. It is lamentable that the Strategic Defence Initiative (SDI)[57] started in the Reagan administration fits such a scenario. The horror of a nuclear war resulted in a period of "peaceful tension" between the United States and the Soviet Union during the Cold War. Technology emerging from SDI, however, will reduce the expected cost of a nuclear war, and therefore increase the likelihood of its occurrence.

β_i is an index of the socio-economic-political fundamental incompatibilities between the state and its adversary (i). This is an indicator of the possible conflicts that may arise between states due to the overlapping of interests. The likelihood index (π) increases with β.

In many ways, defense can be looked at as an activity whose objective is to reduce the likelihood of war (π). This is evident in the mission given to most military forces around the world today -- to deter war and subsequently defeat the enemy, should deterrence fail. The hoped for and preferred scenario is one where there is no war. The military deters war by manipulating the parameters f and τ in [4]

[57]SDI was intended as a defensive weapon which would destroy incoming nuclear ballastic missiles while they are still out in space.

In grappling with the worth of defense, one must eventually be confronted with the question of measuring the "success" of defense programs; questions such as how much has the submarine-launched ballastic nuclear missile program contributed to the overall deterrence effort? The likelihood of war must ultimately be the measure of success for deterrence. The likelihood of war as represented in [4], however, depends just as much on the "state-of-mind" of a potential adversary, as on his or our actions. But to the extent that his "state-of-mind" or perception (and every other parameter in [4]) remains constant over a period of time, changes in the likelihood of war will mirror changes in $\underline{f}$ and τ. Yet, this is inadequate for the analysis of defense spending attempted here. The resource allocation and optimization problem cannot be analyzed without a knowledge of how π (the likelihood of war) changes with $\underline{f}$, and τ (ie. $\frac{\Delta\pi}{\Delta f}$ and $\frac{\Delta\pi}{\Delta\tau}$), which depend on perceptions <u>in the mind of the adversary</u>.

Due to the difficulties involved in finding a yardstick with which to measure the "success" of deterrence efforts (other than the trivial fact that war had not broken out), one is left with little choice but to use the "second" mission of the military -- defeat the enemy should deterence

fail -- as the yardstick to measure the success of defense programs. Here, one is dealing with only one's own perceptions and preferences. Using the ability to defeat an enemy force as the yardstick for measuring the success of defense programs is therefore tenable, though subjective. The ability of one's military to defeat the enemy, however, does not immediately imply success of deterrence, but convincing the enemy that he will be defeated does For subsequent analyses it shall be assumed that the object of defense spending is to acquire sufficient military prowess to defeat the enemy.

The defense spending problem is reduced to one of finding the enemies (or potential enemies) which yields the highest payoffs in utility of security and directing the defense efforts to defeating them. These enemies are, as implied in [3], likely to be those:

a. who threaten vital and/or defense interests,

b. with a high β index (see [4]), and

c. are capable of inflicting great damage to the said interests.

Prior to moving on to the next stage of analysis, three specific characteristics of the utility of security (U) deserve special note. Firstly, the rank ordering approach

used for appraising the utility of national interests (x) ensures that the utility of security function (U) exhibits the properties of diminishing marginal utility with respect to national interests. Secondly, the outlook for the future is an uncertain outcome whose utility valuation requires the use of subjective probability. Finally, the outlook for the future is dependent on actions taken today. This last observation implies that the utility of security is dependent on defense spending.

Before proceeding further it is necessary to, first, address the problem of uncertainty, and examine how rational decisions may be made under conditions of uncertainty.

DEALING WITH UNCERTAINTY

The minimization of costs and the maximization of satisfaction is the basis underlying all economic decisions. When there is no uncertainty, the decision problem is in some ways trivial. Consider two actions, A and B, which yield $100 and $200 respectively. If a choice is to be made between the two, and there is no cost in selecting either, a person will obviously select B. This seems trivial because in our common-sense perception of the world people prefer $200 to $100.

The decision is less straightforward when uncertainty enters the picture. Suppose now that B is a lottery which costs nothing, but has a 50-50 chance of a $200 money prize or nothing. It is now not immediately clear if B will be preferable to A, which yields $100 with certainty. Some may decide to "take the risk" and choose B in the hope of a higher ($200) prize, while others may "play it safe" and be content with the $100 from choosing A. It appears, from the example, that it is almost impossible to systematically analyze decision problems under uncertainty.

The key to solving this predicament lies in the assumption that some "trade-off" between uncertainty and reward will always be possible. It will always be possible to "bribe" an economic agent into accepting more risks (greater uncertainty) by increasing the reward for taking that risk. Ethical principles such as an absolute aversion to gambling will be excluded from the analysis with little loss of robustness.[58] On the question of life and death issues, it suffices to note that people can mostly be persuaded, given the right incentives, to take some

[58]These are likely to be extremities of a very sporadic nature. The persistence of gambling and lottery activities in the world around is sufficient proof of the general "correctness" of the assumption.

reasonable[59] risk of life. During a period of continual peace, with no imminent threat of war, the "risk of life" to a nation-state is unlikely to fall beyond the limits of reasonableness. Therefore, the assumption, for the purpose of an analysis of defense spending, will generally hold in a period of peace.

A prospect is a "lottery" of payoffs with their associated probabilities. A lottery with a payoff of 0 or \$2, each with probability of $\frac{1}{2}$, and a lottery with a payoff of 0 with a probability of $\frac{1}{2}$, \$1 with probability $\frac{1}{4}$ and \$2 with probability $\frac{1}{4}$, are both examples of prospects. Corresponding to each prospect, there is a certainty equivalent. This follows from the earlier assumption that a trade-off exists between uncertainty and reward. The certainty equivalent is the lowest price at which a person will sell the prospect, or the highest price he is willing to pay for it. He is indifferent between the prospect and its certainty equivalent. Intuitively, the greater the payoffs or the probability of non-zero payoffs, the greater will be the certainty equivalent.

The problem of choice under uncertainty can therefore be reduced to an expression of preference over prospects and

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[59]There is an upper limit to the risk of life beyond which no incentive can persuade a person to accept.

their certainty equivalents. A method to preference order prospects was first suggested by Daniel Bernoulli in 1732, and later rigorously proven as a theorem by von Neumann and Morgenstern.[60] The technique is also commonly referred to as the Expected Utility Hypothesis. The hypothesis states that, if $\underline{f}_i$ is a prospect with a series of payoffs $\underline{x}$, each with probability $\underline{p}_i(x)$, then a preference ordering of the prospects $(\underline{f}_1, \underline{f}_2, \underline{f}_3 \ldots)$ is given by

$$U(\underline{f}_i) = \sum_{\underline{x}} p_i(\underline{x})u(\underline{x}) \qquad [61]$$

where u(x) is an order function of the payoffs x under assumed conditions of certainty; ie. the certain payoff x_1 is preferred to the certain payoff x_2 if and only if

$$u(x_1) > u(x_2)$$

while

$$U(\underline{f}_i) > U(\underline{f}_j) \iff \underline{f}_i \text{ is preferred to } \underline{f}_j$$

To understand the character of the preference ordering, it is useful to examine the nature of the function u(x). Obviously, u(x) must increase with increasing x. The function, however, cannot be linear along the entire domain

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[60]Karl Henrik Borch, The Economics of Uncertainty (Princeton: Princeton University Press, 1968), 30.

[61]A proof of this is given in Karl Borch, The Economics of Uncertainty, pp 23-33. Notation used has been changed for greater clarity.

$[0,\infty)$. A counterexample will explain. Suppose, for simplicity, $u(x)= x$. Consider the following game:

> A coin is tossed until it falls heads. If heads occurs for the first time at the nth toss, the player gets a prize of 2^n dollars and the game is over.[62]

The probability that the coin falls heads for the first time at the nth toss is $(\frac{1}{2})^n$. Hence,

$$U = \sum_{n=1}^{\infty} 2^n(\tfrac{1}{2})^n = \infty$$

since it is theoretically possible that the game will go on forever. No reward however large, payable with certainty, will therefore be able to dissuade a person, with preferences described by the linear u(x), out of the game. But in everyday experience, on the contrary, a person given a choice between $2 million payable with certainty and a lottery with an "infinitely" large but uncertain payoff is unlikely to forego the certain $2 million payoff in return for a "gamble". It follows, also, that u(x) must be bounded.[63]

Without loss of generality, suppose now that u(x) is a concave function, since a bounded continuous function must necessarily be concave in at least some interval. A function is concave over an interval (a,b) if

[62]Ibid., 14-15.

[63]The function, u(x), is bounded if and only if there exist a finite N, such that $u(x)<N$ for all x in the domain.

$$u[(1-q)y + qw] \geq (1-q)u(y) + qu(w) \quad \ldots [4]$$

for all y,w in the interval (a,b) and $0 \leq q \leq 1$.

The relation [4] simply means that the straight line drawn between any two points on the function always lie **below** the function (see figure 2, below).

Let y=0, then [4] reduces to

$$u(qw) \geq (1-q)u(0) + qu(w) \quad \ldots [5]$$

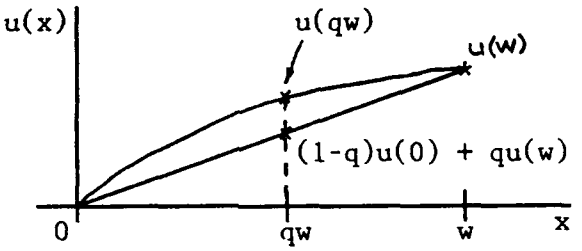

Figure 2.

It is evident, from [5], that for a person whose attitude to risk is represented by the concave u(x), he will not stake an amount of money qw in a gamble which will give him

(w with probability q,
(
(or 0 with probability 1-q.

He may, however, be interested in insurance. To illustrate this, suppose he holds an asset worth w and there is a probability 1-q that this asset may be lost. This is a prospect which gives

(w with probability q,
(
(and 0 with probability 1-q.

But from [5], he will prefer an amount qw, payable with certainty, to this prospect. Therefore, he must be willing to pay a premium of up to (1-q)w in exchange for a prospect which will give

(qw with probability q (present asset less premium, when)
(("disaster" does not happen)
(and
(qw with probability 1-q (payoff from insurance,)
((when "disaster" happens)

ie. a "prospect" which gives qw with a probability of 1.

Hence, if one thinks of the interests of a state as "assets" which can be lost to an adversary, then the risk-aversed state will be willing to pay a "premium" on building a credible defense force to "insure" against the disaster of a loss of those "assets".

A person with a risk preference represented by a convex function, on the other hand, is "risk loving", since for a similar prospect

(w with probability q,
(
(and 0 with probability 1-q;

$$u(qw) < (1-q)u(0) + qu(w)$$

A "risk loving" person will, therefore, stake the amount qw on a chance of increasing it to w with probability q, or losing it with probability 1-q.

The model described thus far does not pretend to be all encompassing. In practice, there is sufficient evidence that people generally have preference orderings which can only be represented by functions which are convex in some intervals and concave in another. This is based on the observation that many people who buy insurance to be protected against big losses are at the same time willing to buy lottery tickets.[64] It is sufficient to note, for the purpose of the analysis, that a state will be risk-averse towards the uncertainty surrounding its national interests and outlook for the future.

DEFENSE SPENDING: CHOOSING BETWEEN DEFENSE AND OTHER NEEDS

The primary foreign policy objective of all nation-states is security and self-preservation. Military power is but one of the many instruments which a nation-state can use to further that end.[65] Military power is not the only

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[64]Ibid., 37.

[65]This was discussed at length in chapter 4.

avenue open to a state to achieve its national security objectives. When one decides categorically that there must be a military that is sufficiently strong to defeat the enemy when attacked, one has in fact already chosen a "worst-case" scenario and ignored the issue of uncertainty and the effects of other policy tools (elements of power).

Often in practice, however, one must assume the "worst-case". As an old Chinese saying goes "water which is far away cannot save a fire nearby". In August 1990, Iraq attacked Kuwait and occupied it without significant resistance. By the time American-led (United Nations sanctioned) coalition forces stormed into Kuwait to expel the Iraqis in February the following year, serious damage was already done. This suggests that at any time a state must be wary of all adversaries that are capable of inflicting great damage to the state, and contend with those who are high on the "conflicts and fundamental incompatibilities" ratings.

A period of continual peace is characterized by peaceful competition between states and the occasional conflict which can be de-escalated and eventually resolved through diplomacy. Despite the above compelling reasons for defense, there is yet room for trade-offs between defense

and other government programs during a period of peace. The key is in looking for indicators which will provide "early warning" to imminent threats. A high alert posture must inevitably have its price. Intelligence is important. With sufficient early warning, defenses can be strengthened. Assistance from allies can be sought. Strategy becomes key.

Building up an armed force takes time. During a period of continual peace, a nation should exploit the opportunities to divert resources away from defense to other needs (by definition, there will never be a better time). While remembering that the state must continue to provide for national security in a "worse-case" scenario, a strategy which requires a minimum standing armed force with a reserve capability to surge, supplemented by diplomacy and intelligence to provide early warning is, yet, an attractive option in a period of peace.

THE DEFENSE MONOPOLY

An often overlooked fact concerning defense is that it is a "monopoly". Military and related professionals are the sole "suppliers" of national security. All "expertise" is in the profession of arms; and where it is not, individuals do not have access to the information which is neccesary to form informed opinions about defense matters. Defense

planners are the designers of strategy. They are also advisors to policymakers on defense matters.

Strategy is as much a product of technology (means) as it is a product of human creativity (ways). How can the efficiency of a strategy be measured if the results which the strategy was intended to achieve (deterrence and defeat of the enemy) is itself, at best, a subjective valuation by defense planners? In a "monopoly" such as that of defense, where there is no profit-making motive, a strategy is only as efficient as defense planners want it to be. Efficiency in strategy is, therefore, strictly speaking, a hollow concept. It is more meaningful at the tactical level where the results against which efficiency is measured are more direct and tangible (eg. destroying a particular target).

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CONCLUSION

Although it is possible to build a resource allocation decision model to analyze defense spending issues, the complexity and inherent subjective nature of the subject would make such a model of little more than mere academic curiosity.

Defense is a public good. Without a market, it is difficult to ascertain the value consumers place on defense.[66] Moreover, the payoff, or utility, from defense is affected by factors other than those under the control of the consumer (ie. actions of the enemy; such as his acquisition of a nuclear capability). It is difficult, therefore, to determine if an exchange optimum has been reached.

The method of Hitch and McKean, by focusing on production efficiency (as opposed to exchange efficiency), was thus a practical approach to the resource allocation problem, although this was clearly unsatisfactory from a strictly theoretical perspective.

[66] Revealed Preference is a technique used to explain comsumer behavior based on an analysis of his consumption pattern in the market. The method allows one to make inferences about the consumer's preferences, and hence his utility function. The reader will find ample discussion of Revealed Preference theory in most advanced college-level microeconomic textbooks.

CHAPTER 7

CONCLUSION

It is a fundamental human tendency for one to want to improve his quality of life, or well-being, whatever "quality of life" or well-being means to the individual or group in question. Defense is a product of necessity in the conduct of international relations because nation-states are constantly competing with each other for the furtherance of each's interests and well-being.

States compete for the world's limited resources. Although the resources of the world are somewhat finite, competition among states for a share of global welfare is not a zero-sum game. Technological advances would have ensured that a growing global welfare "pie" would result in a larger share for each state as time progresses. Contention, however, occurs over the distribution of the gains. Unlike within a state where the government ensures an acceptable distribution of any welfare gains, there is no "higher authority" over states to distribute any gains in global welfare. International relations can, thus, be characterized as competition by nation-states to preserve, if not enhance, their share of global welfare.

If all states were to be content with just what each has, and have no ambitions on another's possessions or achievements, there would be no cause for any state to feel threatened by another. Unfortunately, feelings of relative deprivation, envy, jealousy, frustration, and greed are all part of being human. From the Stone Age to the Space Age, man has been fighting over control of land and resources. In the earlier days, it was for the fertile land on which greater quantities and better quality food could be cultivated. Today, this has expanded to include the mineral resources in the land needed for modern industries. Defense is required to secure one's possessions and interests against threats from greedy adversaries. The desire to feel secure necessitates defense spending.

A period of continual peace is more than just a period free from war. Even when there is tension between states, the probability of war may be low because of the deterrence effects resulting from a parity of military power, as was the case between the United States and the Soviet Union during the Cold War. A period of continual peace is a period relatively free of abrasive conflicts between states. No informed person can reasonably expect war to break out during a period of continual peace. This does not mean,

however, that war cannot or will not break out. This poses a problem for the defense planner.

A war can be devastating for a state. History has proven that a state that is not prepared when the enemy strikes will, often, have to pay dearly.

> It is a doctrine of war not to assume the enemy will not come, but rather to rely on one's readiness to meet him ...[67]

The need for defense stands regardless of whether one is in a "period of continual peace". The key to defense spending in a period of continual peace lies in acquiring indicators that will provide early warning to the state when it has transgressed from peace into tension.

There is scope for reductions in defense spending in a period of peace because a lower level of force readiness is needed. How great a reduction can be effected, however, must depend on the actions of its potential adversaries. The state must not be surprised by its adversaries. In war, there is no substitute for victory. Because of the near impossibility of measuring the extent and success of deterrence, having forces and equipment to defeat the enemy becomes an overriding consideration. The state must match any arms build-up by a potential adversary which threatens to significantly change the odds for victory. Actions of potential adversaries will dictate the extent to which a

[67]Sun Tsu, 114.

state may reduce its defense spending during a period of peace.

At the time of writing, the United States Department of Defense announced that it would reduce the size of its standing armed forces over a period of five years. This was consistent with the break up of the Warsaw Pact and reduced threat from the Soviet Union. The interests of the United States had not changed, but the capabilities of its enemies had. War in Europe is now less likely. As the chance of war become more remote, a lower level of force readiness is needed. There, however, remains a need to maintain the capability to increase the armed forces in a timely manner in response to an escalation by the enemy.

Although a reduction of the armed forces is forthcoming because of the diminished threat, little can be said about the extent of the reduction. The amount of reduction that can be made is entirely a decision of defense planners. For the many reasons already discussed in the previous chapter, it is difficult, if not impossible, for a layman to assess just what the "right" amount of reduction should be.

* * * * * * * *

Peace does not abdicate the need for defense spending because the underlying tendencies for competition and

conflict continue to exist. This study has revealed that defense spending will continue to be justifiable in a period of continual peace. Although a lower level of spending can be expected, it is impossible to evaluate just what the "right" level of spending ought to be. The amount of subjective valuation involved in the assessment of defense spending -- of probabilities and of an adversary's utility function -- will make the analysis little more than an academic exercise. It would be difficult to logically fault any defense spending decision. The problem is made no easier by the lack of access to security related facts and information. Nonetheless, it is hoped that this paper has helped to open up the many complex and often little understood national security and defense spending issues.

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